ESTUARY and COASTAL WATER ASSESSMENT

Background

An estuary is a coastal area where fresh water from rivers and streams mixes with salt water from the ocean. Many bays, sounds, and river mouths along the coast are estuaries. They are critical for the survival of fish, birds, and other wildlife because they provide spawning grounds and nurseries. Marshes and other vegetation in the estuaries protect marine life and water quality by filtering sediment and pollution.

Like our estuaries and other surface waters, Maine's coastal waters have great economic, recreational, and aesthetic value. A great part of our heritage was built upon them. Every year thousands use them for boating, commercial and recreational fishing, swimming, and scuba diving.

There are two significant causes for non-attainment of uses for marine and estuarine waters. One is bacteria, which leads to shellfish area closures every year. It comes mostly from failing septic systems or improperly maintained **overboard discharge systems** (OBD's are small, privately owned wastewater treatment systems along the coast). **Nonpoint source pollution** (pages 1 & 7) and **CSO's** (page 7) also contibute bacteria, along with excess nutrients and other pollutants. The second cause of non-attainment of uses for these waters is due to toxins. The presence of toxins is the reason for the lobster tomalley advisory.

There are two primary types of toxic pollutants that have been associated with **point** and **nonpoint source pollution**: organic chemicals and heavy metals. Many organic chemicals occur naturally, while thousands of others have been developed for use in oils, paints, pesticides, cleaners, solvents, and other products. They remain toxic until they eventually break down. Heavy metals are basic elements, do not break down, and tend to accumulate where they are released. In addition, many Maine rivers which drain into coastal waters carry with them their own point and nonpoint source pollution. The ocean is not a bottomless pit, capable of absorbing infinite wastes.

Assessment

Contact: John Sowles, DEP BLWQ, Division of Environmental Assessment (207) 287-6110 or 3901.
Casco Bay Estuary Project Questions: Katherine Groves (207) 780-4820.

Assessment of estuarine and coastal water quality is done primarily by two state agencies; the Department of Marine Resources (DMR) and Department of Environmental Protection (DEP). The DMR conducts a broad monitoring program and is responsible for closing shellfishing areas which have been determined to be contaminated with elevated levels of bacteria. These closings are based on water samples collected in shallow water along the shore. At the end of 1995, there were 230 closed shellfish areas, slightly less than in 1994. The DEP's Marine Environmental Monitoring Program monitors and researches other water quality issues within the 5,500 miles of near-coastal waters. Additional monitoring also comes from other sources such as the **Casco Bay Estuary Project** (CBEP), described on the following page. Casco Bay has been designated as a priority waterbody because of bacterial pollution and evidence of toxic pollutants in fish liver, lobster tomalley, mussels, and sediments.

Individual Use Support Summary

Use	Supporting	Supporting, but Threatened	Partially Supporting	Not Supporting	Not Attainable
Shellfish (sq. mi.)[1]	2,430.1	0	38.4	382.5	
Shellfish (lobster tomalley only)[2]	0	0	2,851	0	0
Aquatic Life Support (sq. mi.)[3]	2,841.5	0	0	9.5	0
Swimming (sq. mi.)[4]	2,846.1	0	0	4.9	0

1. Area estimated by the Maine Department of Marine Resources.
2. Based on statewide shellfish consumption advisory for lobster tomalley (see page 8).
3. Use category includes propogation of fish, shellfish, and wildlife.
4. Use category includes recreation in and on the water.

Case Study: Contaminants in Casco Bay Sediments

Contact: Lee Doggett, DEP BLWQ, Divison of Environmental Assessment (207) 287-7666.

Background: When scientists first examined the sediments of Casco Bay in 1980, they discovered a broad array of toxic contaminants in what had been considered a relatively uncontaminated environment. Further studies of Casco Bay sediments were conducted in 1989 by the DEP, and then by the Casco Bay Estuary Project in 1991 and 1994, to determine the types, sources, and locations of toxic pollutants.

Findings: Two classes of organic chemicals (PCBs and PAHs) are present at potentially toxic levels to bottom-dwelling animals in the inner Fore River of Casco Bay. PAHs (polychlorinated aromatic hydrocarbons) along with four heavy metals (lead, cadmium, mercury, and silver) are considered “high” in some locations, especially in Portland Harbor. Two banned pesticides can still be found in the bay.

Bottom-Dwelling Animals: Bottom-dwelling ("benthic") animals that would be expected to occur in the Fore River and Back Cove are missing, possibly due to such factors as oil-related contaminants, heavy metals, combined sewer overflow discharges, sedimentary disturbances, or a combination of factors.

Fisheries: Sediment contamination can have serious effects on fisheries and marine life in Casco Bay. Fish and crustaceans can absorb toxins, particularly bottom-dwelling organisms. This can occur directly, by exposure to contaminants in the water, and indirectly, by eating contaminated food.

Wildlife: Mammals and birds that feed on benthic organisms or fish may absorb concentrated amounts of contaminants. Some of the tidal mudflats that represent the most important feeding areas for shorebirds, waterfowl, and wading birds also have the highest concentration of contaminated sediments in the bay.

Human Health: Various toxic pollutants concentrate in the liver, fat, and tissue of marine organisms, and may pose health risks to human consumers (see pages 8 & 9).

Toxics Contamination

Toxic contamination monitoring consists of that done by the Gulf of Maine Council on the Marine Environment, the Maine Dioxin Monitoring Program, the Casco Bay Estuary Project (CBEP), the Maine Coastal Program, and more recently the Surface Water Ambient Toxics Monitoring Program (SWAT). Focus has been placed on collecting information on toxic contaminants in surface sediments, blue mussel and lobster tissues.

Sediment: With a few exceptions, studies indicate that levels of toxic pollutants are higher in fine-grained sediments and near or adjacent to highly populated areas, such as the mouths of major rivers and ports. Some toxins are high where petroleum is handled: marine terminals, marinas, and urban areas. Dioxins in marine sediments have only been monitored in Casco Bay, where higher concentrations are found near the mouth of the Presumpscot River and in the eastern portion of the bay which appears to be influenced by water from the Kennebec River.

Tissues: Blue mussel soft tissue has been studied from 63 sites along the Maine coast over a period of ten years. Lobster muscle and tomalley were studied from 18 sites along the coast in 1994 and 1995. Results thus far have shown that levels of toxic contaminants measured are, with the exception of lobster tomalley for which a human health advisory has existed since 1992, well within acceptable limits. Tomalley continues to contain levels of dioxins that exceed the Department of Human Services's standard. The recent SWAT results also show that cadmium exceeds EPA screening values.

Results seem to point out that the Maine coast continues to have lower levels of contamination than other eastern states although localized areas of toxic contamination exist, especially around human population centers. Areas of concern are, at this point, limited to six areas of Maine's coast which are listed below.

Marine and Estuarine Areas of Concern for Toxic Contamination

(Based on professional judgement. Biological standards must be developed to assess attainment and monitoring must be conducted to assess impact.)

Location	Area
❶ Piscataqua River Estuary	2,560 acres
❷ Fore River	1,230 acres
❸ Back Cove	460 acres
❹ Presumpscot River Estuary	620 acres
❺ Boothbay Harbor	410 acres
❻ Cape Rosier (near abandoned mine)	80 acres